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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/781,232	02/18/2004	Hardayal Singh Gill	HIT1P058/HSJ920030249US1	2369

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EXAMINER	
KLIMOWICZ, WILLIAM JOSEPH	
ART UNIT	**PAPER NUMBER**
2627	

DATE MAILED: 07/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/781,232	GILL, HARDAYAL SINGH	
	Examiner	Art Unit	
	William J. Klimowicz	2627	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *13-22 and 24* is/are allowed.

6)☒ Claim(s) *1-3,5,8-12 and 23* is/are rejected.

7)☒ Claim(s) *4,6 and 7* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 February 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

Figures 1A-2B should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The disclosure is objected to because of the following informalities:

With regard to page 1, lines 6-9, under the heading "RELATED APPLICATION," the corresponding U.S. Patent Application Number and filing date should be inserted.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3, 5, 8-12 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhu (US 2002/0101691 A1) in view of Nakada et al. (US 6,341,053 B1).

As per claim 1, Zhu (US 2002/0101691 A1) discloses a magnetic head (10), comprising: a free layer (30), an antiparallel (AP) pinned layer structure (32, 36, 38) spaced apart from the free layer (30); and a biasing structure (40) positioned towards the AP pinned layer (32, 36, 38) structure on an opposite side thereof relative to the free layer (30), the biasing structure (40) pinning a magnetic orientation of the AP pinned layer structure (32, 36, 38).

As per claim 2, wherein the AP pinned layer structure (32, 36, 38) includes at least two pinned layers (32, 38) having magnetic moments (the circled "x" and the circled "dot" in FIG. 2) that are self-pinned antiparallel to each other, the pinned layers being separated by an AP coupling layer (36).

As per claim 3, wherein the pinned layers (32, 38) of the AP pinned layer structure (32, 36, 38) are formed of CoFe (see paragraph [0026]).

As per claim 9, wherein the head forms part of a GMR head (e.g., see paragraph [0018]).

As per claim 10, wherein the head forms part of a CPP GMR sensor (e.g., see paragraph [0018]).

As per claim 11, wherein the head forms part of a CIP GMR sensor (e.g., see paragraph [0018]).

As per claim 12, wherein the head forms part of a tunnel valve sensor (e.g., see paragraph [0018]).

As per claim 23, a magnetic storage system (FIG. 1) is additionally provided, comprising: magnetic media (16); at least one head (10) for reading from and writing to the magnetic media (16), each head having: a sensor having the structure recited in claim 1; a writer coupled to the sensor; a slider for supporting the head (see paragraph 0001 and paragraph 0020); and a control unit coupled to the head for controlling operation of the head (inherently provided as is known, in order for the magnetic system to function as intended).

As per claim 1 and claim 5, however, Zhu (US 2002/0101691 A1) does not expressly disclose wherein the biasing structure is a "high coercivity" structure. More concretely, in order to pin the pinned layer of the magnetoresistive sensor, Zhu (US 2002/0101691 A1) discloses using an antiferromagnetic material (IrMn) to bias the pinned layer of ferromagnetic material - see paragraph [0026] of Zhu (US 2002/0101691 A1).

Official notice is taken, however, that high coercivity material, such as CoPtCr used in an analogous type of magnetoresistive sensor, to expressly biasingly pin a ferromagnetic pinned layer, being used in lieu of or as a substitute for an antiferromagnetic layer such as IrMn, is notoriously old and well known and ubiquitous in the art; such Officially noticed fact being capable of instant and unquestionable demonstration as being well-known.

As just a single example, Nakada et al. (US 6,341,053 B1) discloses a conventional magnetoresistive sensor, having a free layer and a pinned layer, wherein the pinned ferromagnetic layer is pinned by a high coercivity structure formed of CoCrPt, in substitution or lieu of an antiferromagnetic layer formed of IrMn (e.g., see COL. 5, line 4; COL. 5, lines 34-42; COL. 7, line 59 *et seq.*)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a high coercivity material, such as CoPtCr, for the magnetoresistive sensor of Zhu (US 2002/0101691 A1), to expressly biasingly pin a ferromagnetic pinned layer, in lieu of or as a substitute for an antiferromagnetic layer such as IrMn, as is notoriously old and well known and ubiquitous in the art, exemplified by Nakada et al. (US 6,341,053 B1).

The rationale is as follows: one of ordinary skill in the art would have been motivated to provide a high coercivity material, such as CoPtCr, for the magnetoresistive sensor of Zhu (US 2002/0101691 A1), to expressly biasingly pin a ferromagnetic pinned layer, in lieu of or as a substitute for an antiferromagnetic layer such as IrMn, as is notoriously old and well known and ubiquitous in the art, exemplified by Nakada et al. (US 6,341,053 B1), in order to provide an exchange coupling between the ferromagnetic pinned layer and the pinning layer which develops a magnetic anisotropy, thus aligning magnetization of the ferromagnetic pinned layer along an MR height direction, as is well known, established and appreciated in the art.

That is, the AFM pinning layer IrMn and hard biasing layer CoPtCr are art recognized equivalent pinning layers as evidenced by at least Nakada et al. (US 6,341,053 B1), wherein the ARM layer and the CoPtCr layer, in the context of the combination of Zhu (US 2002/0101691 A1) and Nakada et al. (US 6,341,053 B1), produce the same function, operate in the same way and are utilized to obtain the same result. Moreover, such a conventionally recognized art recognized equivalent, absent any evidence of criticality, is considered to be an obvious expedient.

Additionally, as per claim 8, although Nakada et al. (US 6,341,053 B1) as applied to Zhu (US 2002/0101691 A1), remains silent with respect to a seed layer of magnetic material under the CoPtCr, Official notice is taken that seed layers for promoting prescribed crystallographic growth of magnetic materials are notoriously old and well known and ubiquitous in the art; such Officially noticed fact being capable of instant and unquestionable demonstration as being well-known.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a seed layer of magnetic material under the CoPtCr of Nakada et al. (US 6,341,053 B1), as applied to Zhu (US 2002/0101691 A1), as is known in the art.

The rationale is as follows: one of ordinary skill in the art would have been motivated to provide a seed layer of magnetic material under the CoPtCr of Nakada et al. (US 6,341,053 B1), as applied to Zhu (US 2002/0101691 A1), as is known in the art, in order to promote a desired crystallographic orientation and growth of the magnetic material deposited subsequently thereon, as is well known, established and appreciated in the art.

Claims 1-3, 5, 8-12 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhu (US 2002/0101691 A1) in view of Gill (US 6,105,237).

As per claim 1, Zhu (US 2002/0101691 A1) discloses a magnetic head (10), comprising: a free layer (30), an antiparallel (AP) pinned layer structure (32, 36, 38) spaced apart from the free layer (30); and a biasing structure (40) positioned towards the AP pinned layer (32, 36, 38)

structure on an opposite side thereof relative to the free layer (30), the biasing structure (40) pinning a magnetic orientation of the AP pinned layer structure (32, 36, 38).

As per claim 2, wherein the AP pinned layer structure (32, 36, 38) includes at least two pinned layers (32, 38) having magnetic moments (the circled "x" and the circled "dot" in FIG. 2) that are self-pinned antiparallel to each other, the pinned layers being separated by an AP coupling layer (36).

As per claim 3, wherein the pinned layers (32, 38) of the AP pinned layer structure (32, 36, 38) are formed of CoFe (see paragraph [0026]).

As per claim 9, wherein the head forms part of a GMR head (e.g., see paragraph [0018]).

As per claim 10, wherein the head forms part of a CPP GMR sensor (e.g., see paragraph [0018]).

As per claim 11, wherein the head forms part of a CIP GMR sensor (e.g., see paragraph [0018]).

As per claim 12, wherein the head forms part of a tunnel valve sensor (e.g., see paragraph [0018]).

As per claim 23, a magnetic storage system (FIG. 1) is additionally provided, comprising: magnetic media (16); at least one head (10) for reading from and writing to the magnetic media (16), each head having: a sensor having the structure recited in claim 1; a writer coupled to the sensor; a slider for supporting the head (see paragraph 0001 and paragraph 0020); and a control unit coupled to the head for controlling operation of the head (inherently provided as is known, in order for the magnetic system to function as intended).

As per claim 1 and claim 5, however, Zhu (US 2002/0101691 A1) does not expressly disclose wherein the biasing structure is a "high coercivity" structure. More concretely, in order to pin the pinned layer of the magnetoresistive sensor, Zhu (US 2002/0101691 A1) discloses using an antiferromagnetic material (IrMn) to bias the pinned layer of ferromagnetic material - see paragraph [0026] of Zhu (US 2002/0101691 A1).

It is extremely well known in the art, however, that high coercivity material, such as CoPtCr used in an analogous type of magnetoresistive sensor, to expressly biasingly pin a ferromagnetic pinned layer, being used in lieu of or as a substitute for an antiferromagnetic layer such as IrMn, is notoriously old and well known and ubiquitous in the art; such Officially noticed fact being capable of instant and unquestionable demonstration as being well-known.

As an example, Gill (US 6,105,237) discloses a conventional magnetoresistive sensor, having a free layer and a pinned layer, wherein the pinned ferromagnetic layer is pinned by a high coercivity structure formed of CoCrPt, in substitution or lieu of an antiferromagnetic layer formed of IrMn (e.g., see COL. 3, line 46 through COL. 4, line 10).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a high coercivity material, such as CoPtCr, for the magnetoresistive sensor of Zhu (US 2002/0101691 A1), to expressly biasingly pin a ferromagnetic pinned layer, in lieu of or as a substitute for an antiferromagnetic layer such as IrMn, as is notoriously old and well known and ubiquitous in the art, exemplified and expressly suggested by Gill (US 6,105,237).

The rationale is as follows: one of ordinary skill in the art would have been motivated to provide a high coercivity material, such as CoPtCr, for the magnetoresistive sensor of Zhu (US 2002/0101691 A1), to expressly biasingly pin a ferromagnetic pinned layer, in lieu of or as a

substitute for an antiferromagnetic layer such as IrMn, as is notoriously old and well known and ubiquitous in the art, exemplified and expressly suggested by Gill (US 6,105,237), in order to provide "a pinning layer for a spin valve sensor that has improved thermal stability and that does not affect the coercivity of the free layer ... to provide a hard magnetic pinning layer for a spin valve sensor that has high coercivity for pinning a pinned layer, but substantially no magnetic moment to affect the coercivity of the free layer ... to provide a pinning layer that can have its magnetic moment reset by a magnet at room temperature ... to employ a high coercivity pinning layer for pinning a pinned layer of a spin valve sensor without affecting the sensitivity of the sensor" as explicitly and expressly suggested and taught by Gill (US 6,105,237) (see COL. 3, line 64 through COL. 4, line 9).

Additionally, as per claim 8, although Gill (US 6,105,237) as applied to Zhu (US 2002/0101691 A1), remains silent with respect to a seed layer of magnetic material under the CoPtCr, Official notice is taken that seed layers for promoting prescribed crystallographic growth of magnetic materials are notoriously old and well known and ubiquitous in the art; such Officially noticed fact being capable of instant and unquestionable demonstration as being well-known.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a seed layer of magnetic material under the CoPtCr of Gill (US 6,105,237), as applied to Zhu (US 2002/0101691 A1), as is known in the art.

The rationale is as follows: one of ordinary skill in the art would have been motivated to provide a seed layer of magnetic material under the CoPtCr of Gill (US 6,105,237), as applied

to Zhu (US 2002/0101691 A1), as is known in the art, in order to promote a desired crystallographic orientation and growth of the magnetic material deposited subsequently thereon, as is well known, established and appreciated in the art.

Allowable Subject Matter

Claims 4, 6 and 7 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 13-22 and 24 are currently allowed.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William J. Klimowicz whose telephone number is (571) 272-7577. The examiner can normally be reached on Monday-Thursday (6:30AM-5:00PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa Thi Nguyen can be reached on (571) 272-7579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

William J. Klimowicz
Primary Examiner
Art Unit 2627

WJK